Endoscopic Vacuum Therapy for Esophageal Leakage

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Abstract

The reported incidence of esophageal anastomotic leakages after gastrectomy and esophagectomy ranges from 5% to almost 30%. Within the last 10 years endoscopic treatment has changed the approach to intrathoracic anastomotic leakages. Implantation of completely covered self-expanding metal or plastic stents is the endoscopic method that has been most extensively studied, and it has proven to be effective in 67–100% of cases. The successful closure of intrathoracic anastomotic leaks by endoscopic placement of a vacuum sponge endoscopic vacuum assisted closure (E-VAC) has recently been reported. Vacuum-assisted closure (VAC) is an established treatment modality for extensive cutaneous infected wounds. This principle has been adapted to endoscopically accessible upper gastrointestinal leakages by endoscopically placing sponges that have been connected with a drainage tube in the necrotic cavities (E-VAC). Here, how the technique works and how vacuum sponge therapy rapidly improves intrathoracic necrotic cavities after upper gastrointestinal leakage are demonstrated. This article is part of an expert video encyclopedia.

Keywords

Endoscopic vacuum; Esophageal leakage; Mediastinitis; Standard endoscopy; Stent; Vacuum-assisted closure; Video.

Video Related to this Article

Video available to view or download at doi:10.1016/S2212-0971(13)70023-2

Materials

- Nasogastric tube: Freka Tube, 15 Ch (Fresenius Kabi, Bad Homburg v.d.H., Germany).
- Sponge: Polyurethane foam, pore size 400–600 μm (KCI, Wiesbaden, Germany).
- Mersilene suture: 0.35 mm (Johnson & Johnson, St-Stevens-Woluwe, Belgium).
- Grasping forceps (Olympus, Hamburg, Germany).
- Endoscope (Gif-Q165, Gif-Q180H, or Gif-Q145; Olympus, Hamburg, Germany).
- Vacuum pump (KCI, Wiesbaden, Germany).

Background and Endoscopic Procedures

Intrathoracic leakage is a serious complication after esophageal surgery. The reported incidence of esophageal anastomotic leaks after gastrectomy and esophagectomy ranges from 5% to almost 30%. Esophageal leakage can induce mediastinitis and is associated with a high mortality rate. Within the last 10 years endoscopic treatment has changed the approach to intrathoracic anastomotic leakages. Implantation of completely covered self-expanding metal or plastic stents is the best established interventional endoscopic approach to treat intrathoracic leakages. Success rates of 67–100% have been reported. Covered stents effectively close the leakage. However, an additional percutaneous drainage is mandatory, as the stent seals the infected cavity.

Endoscopic vacuum therapy has been proven to be an important treatment alternative in patients with intestinal leakage not responding to established endoscopic and/or surgical treatment. The method has been adapted from vacuum-assisted closure for infected cutaneous wounds. It is based on negative pressure applied to the wound via a vacuum-sealed sponge. The sponge results in formation of granulation tissue, whereas the vacuum removes wound secretions, reduces edema, and improves blood flow. This results in a clean wound base and improves consecutive wound closure. This principle has been transferred to endoscope-accessible upper gastrointestinal leakages by endoscopically placing sponges that have been connected with a drainage tube in the necrotic cavities.

A silicone duodenal tube is introduced via the nose and orally exteriorized. A polyurethane foam is fixed to the tip of the duodenal tube with a mersilene suture. The sponge is fashioned to the specific wound size. The wound size is estimated by the endoscopist. The sponge size has to be smaller than the wound cavity to promote collapse and consecutive closure of the fistula. The sponge is grasped with a grasping forceps and introduced under vision in the necrotic cavity using a regular orthograde endoscope. A continuous suction of 125 mm Hg is applied using a vacuum pump. For sponge removal the suction is discontinued, and the tube is grasped with a grasping forceps close to the distal end, pulled out of the wound cavity, and orally exteriorized. The sponge is exchanged twice a week, until the base of the cavity appears clean and firmly closed.

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Key Learning Points/Tips and Tricks

- Endoscopic vacuum sponge treatment is an effective treatment alternative to stent placement in upper gastrointestinal leaks.
- Use small sponges as a big sponge might hinder correct placement.

Complications and Risk Factors

Bleeding is a potential life-threatening complication.

Scripted Voiceover

00:00 Intrathoracic leakage is a serious complication after esophageal surgery. The reported incidence of esophageal anastomotic leaks after gastrectomy and esophagectomy ranges from 5% to almost 30%.

00:17 Esophageal leakage can induce mediastinitis and is associated with a high mortality rate.

00:24 Implantation of completely covered self-expanding metal or plastic stents is the best established interventional endoscopic approach to treat intrathoracic leakages. Success rates of 67–100% have been reported. Covered stents effectively close the leakage, but due to the infected cavity behind the stent additional percutaneous drainage is required.

00:45 Here we show a case that has been treated with a covered stent for anastomotic leakage after esophageal resection. After stent removal we see a persistent leakage with an intrathoracic fistula at the anastomosis.

01:03 Endoscopic vacuum therapy has been proven to be an important treatment alternative in patients with intestinal leakage. The method has been adapted from Vacuum assisted closure for infected cutaneous wounds. A sponge that has been connected with a drainage tube is endoscopically inserted in the necrotic cavity.

01:18 A continuous suction of 125 mmHg is applied.

01:22 The sponge results in formation of granulation tissue, while the vacuum removes wound secretions, reduces edema and therefore improves blood flow. This results in a clean wound base. The sponge is exchanged two to three times weekly and its size is adjusted to the cavity. Using this method the wound size decreases and after a median of twenty days the sponge can be removed. The remaining small cavity will heal spontaneously.

01:48 For endoscopic vacuum therapy a naso-gastric tube is introduced via the nose and orally exteriorized.

01:54 A polyurethane foam is fixed to the tip of the duodenal tube.

01:59 The sponge is fashioned to the specific wound size as estimated by the endoscopist.

02:02 Then the sponge is grasped with a grasping forceps and introduced under vision in the necrotic cavity. A continuous suction of 125 mm Hg is applied by using a vacuum pump. At times it can be very difficult to introduce the sponge to the leakage. A transparent hood can be helpful in difficult cases.

02:57 For sponge removal the suction is discontinued, the sponge is flushed with saline and then, grasped endoscopically, pulled out of the wound cavity. The sponge is exchanged at least twice a week.

03:12 This contrast study shows a persisting leakage after esophagectomy despite placement of two covered metal stents.

03:19 After stent removal, endoscopy shows a necrotic cavity with draining tubes in place. We placed a vacuum sponge in the orifice of the necrotic cavity.

03:38 Already after 4 day and one sponge exchange the necrotic cavity presents with clean wound grounds and the size has significantly decreased.

03:49 The leakage shows further improvement after 7 day of treatment.

04:01 After 15 day of endoscopic vacuum sponge treatment the leakage appears clean and shows a stable wound base. At this time the sponge treatment was finished.

04:08 Ten days later the patient is clinically stable and endoscopy shows an out pouching at the anastomosis but no fistula.

04:20 Here we show another case with anastomotic leakage after gastrectomy. A draining tube can be seen in the cavity and is removed before vacuum sponge therapy.

04:33 You can see endoscopic placement of a vacuum sponge in this case. The size of the sponge is important for successful treatment. The sponge should not be too big, as this can make it impossible to introduce it in the cavity. As the vacuum induces a collapse of the cavity the sponge should be much smaller than the cavity itself.

05:11 Ten days after initiating endoscopic vacuum therapy we see formation of granulation and vascularization.

05:17 After 14 day the leakage shows further granulation and only a small remaining fistula on the base.

05:31 Eighteen days after beginning vacuum sponge therapy the cavity is getting significantly smaller.

05:39 With a clean wound base we finished the endoscopic vacuum therapy after 22 day of consecutive vacuum sponge treatment.

05:44 Twenty-four days later the patient is stable and endoscopically no remaining fistula can be detected.

Further Reading

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